

comprising a second insulating layer with a second type of stress that is different from said first type of stress, so as to adjust stress of overall structure.

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(concluded)

51. A semiconductor device according to claim 50, wherein said first type of stress is compressive stress, and said second type of stress is tensile stress.

52. A semiconductor device according to claim 49, wherein said interconnection layer is made of aluminum.

REMARKS

A petition for a two month extension of time has today been filed as a separate paper and a copy is attached hereto.

The rejections for obviousness over Matsuura alone and, in the case of claim 40, over Matsuura in view of Harriott are respectfully traversed. The disclosure of Matsuura is relevant in two respects, i.e., it teaches (1) cracks that would otherwise be generated in the TEOS-APCVD film 14 can be reduced by forming the insulating film 13, superior in crack-resistance, over the metal conductor 12, and (2) stress migration that would otherwise occur in the metal conductor 12 can be prevented by sandwiching the TEOS-APCVD film 14 between the upper and lower insulating films 13 and 16 (column 7, lines 1-11). Reading Matsuura as a whole, regarding

the first point of relevance, Matsuura seems to be motivated by the assumption that TEOS-APCVD film 14, which is inferior in crack-resistance, is protected from being cracked by underlying insulating film which is superior in crack-resistance as compared to the TEOS-APCVD film 14. This motivation focuses on the interior-superior relationship between TEOS-APCVD film 14 and the film formed under same and ignores the stress relationship between these films. All that can really be deduced from Matsuura is that one can strengthen a film inferior in crack-resistance by forming a film having superior crack-resistance in contact with the inferior film.

Regarding the second aspect of relevance, Matsuura seems to focus on the fact that the stress migration in the metal conductor is reduced by relaxing the stress, not of the metal conductor itself, but of the film formed in contact with the metal conductor. That is, Matsuura does not focus on reducing the stress migration in the metal conductor by relaxing the stress of metal conductor itself.

In contradistinction, new claim 43 defines a method which results in a structure wherein the interconnection layer is sandwiched between first and second insulating films having the same type of stress, so that the stress of the interconnection layer itself is relaxed and bending in the interconnection layer is thereby suppressed. As explained above, the skilled artisan would

not have been motivated by the teachings of Matsuura to practice a method resulting in a structure wherein the metal conductor is sandwiched between films having the same type of stress.

It is well established that motivation is a necessary element for a *prima facie* case of obviousness. In ACS Hospital Systems, Inc. v. Montefiore Hospital, 221 USPQ 929 (Fed. Cir. 1984) the U.S. Court of Appeals for the Federal Circuit held:

"Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined only if there is some suggestion or incentive to do so." [221 USPQ at 933]

In In re Fritch, 23 USPQ2d 1780 (Fed. Cir. 1992) that same court quoted the above and further held that the requirement for motivation ("incentive") also applied to any issue of obviousness of modifying a reference:

Although couched in terms of combining teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious "modification" of the prior art. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. Wilson and Hendrix fail to suggest any motivation for, or desirability of, the changes espoused by the Examiner and endorsed by the Board. [23 USPQ2d at 1783, 1784]

Thus, the MPEP §706.02(j) requires of the examiner, in all obviousness rejections:

(D) an explanation why one of ordinary skill in the art at the time the invention was made would have been motivated to make the proposed modification.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. [Emphasis added.]

Thus, in all fact situations, motivation is a necessary element for any proper finding of *prima facie* obviousness. Neither our courts nor the MPEP allows for any exception, in a fact situation involving an issue of "duplication" of disclosed steps, or otherwise. Accordingly, it is respectfully submitted that the allegedly obvious "duplication of the steps of Matsuura" cannot be regarded as *prima facie* obvious unless the examiner can point to some motivation for such "duplication." What applicants have complained of in their previous response remains true, i.e., the examiner has not explained "why one of ordinary skill in the art at the time the invention was made would have been motivated to" duplicate the steps of Matsuura. In other words, the examiner has not provided the explanation "(D)" required by MPEP §706.02(j).

At page 4 of the office action the examiner writes:

If applicants' structure produced by the claimed method contains a new or unexpected result over the prior art, the claims do not reasonably enable one of ordinary skill in the art to achieve it and the applicant must enable one of ordinary skill in the art to achieve the improvement by amending the claims in such a way as to enable improvements over the prior art.

As the Court in Fritch made clear, there is no burden on the applicant to prove "a new or unexpected result" until a *prima facie* case of obviousness has been made and no *prima facie* obviousness is established absent the required motivation discussed above. Further, the examiner's comments regarding enablement are not understood. Enablement is a requirement of 35 USC 112, first paragraph, not a requirement of 35 USC 103.

In the paragraph spanning pages 4 and 5 of the office action, the examiner writes:

The examiner respectfully submits that upon reading Matsuura, as a whole, one of ordinary skill in the art readily recognizes that there is no explicit teaching that the inner layer insulating film (14) discussed in the alternate embodiment with Figs. 5A and 5B cannot be the same interlayer insulating film (35) discussed in the embodiment pertaining to Fig. 6A.

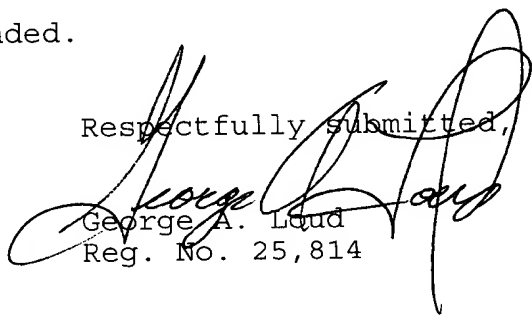
To the extent that it can be understood, the examiner would predicate his case on thin air, i.e., that which is not in the reference teachings. It is not understood how one skilled in the art would have been motivated by what the reference does not teach to duplicate the steps which the reference does teach.

In similar fashion, claim 49, which is directed to the structure corresponding to the method of claim 43, would not have been motivated by the teachings of Matsuura.

With regard to claim 46 (see original claim 2), none of the cited references discloses or suggests that multiplication of the thickness and the stress for each film and the addition of those results gives the stress for the film as a whole.

In conclusion, it is respectfully requested that the examiner reconsider the rejections of record with a view toward allowance of the claims as amended.

Respectfully submitted,


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